DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

ANNUAL REPORT

OF THE

DUMRAON EXPERIMENTAL FARM

FOR

1893-94.

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ANNUAL REPORT OF THE DUMRAON EXPERIMENTAL FARMS FOR 1893-94.

1. It was remarked in paragraph 21 (page 16) of the Annual Agricultural Report of the Department for the year ending 31st March 1893 that almost all the plots in the experimental farms at Dumraon and Bhojpur had been at some time or other placed under experiment, and each plot had in consequence received a different treatment from its neighbours. It is one of the main conditions indispensable to accurate experiment, that the contrasted plots should be physically and chemically alike. To secure this condition, it became necessary to considerably restrict the scope of experiments and to crop the greater portion of the main experimental farm at Dumraon without the addition of any manure, in order to exhaust the soil of the residues of manures applied in previous years. This course has been steadily followed on a large number of plots for the last two years, and it is believed that they are of sufficiently even quality to be laid anew under experiment.

2. Dr. Voelcker inspected the experimental farm in 1890, and observed that it was a common tendency in most experimental farms in India to have a number of issues depending on a single experiment, as for example, when an experiment is intended to contrast the effects of a number of single and combined manures. He considered this to be a great mistake, and advised that the experiments at the Dumraon farm should be fewer in number and more simple in character than they were at the time. Dr. Voelcker has also given the same advice in his report (*vide* pages 373-4). Acting upon his advice, I found it necessary to modify the original plan of experiments; and as these had been continued for upwards of five years, there appeared to be no special reasons for continuing them.

3. The crop experiments made during the year under report were limited to paddy and wheat. The experiments with paddy were as follow:—

(1). The first experiment was to test the effects of deep *vs.* shallow cultivation. This is a permanent experiment commenced in the year under report. Twelve plots of land, each measuring 800 square yards, were selected for the experiment; six of these were deep ploughed, and the remaining six shallow ploughed. The deep ploughing was effected by the Sibpur wrought iron plough, which was closely followed in the same furrow by a country plough. Even then the depth of soil reached by the ploughs was not more than 5¼ inches, such is the excessively stiff character of the soil we have to deal with. The shallow ploughing was effected by the country plough in the ordinary way, and extended to the depth of 3 inches. The deep-ploughed plots were first ploughed twice with the Sibpur followed by the country plough; the shallow-ploughed plots were altogether ploughed three times. The difference in cost of ploughing between the deep and shallow ploughed plots

amounted to Rs. 2-4-3 per acre. All the twelve plots were manured with cowdung at the rate of 100 maunds per acre. The results of the experiment given in Appendix A (*i*) to this report show that all the *deep-ploughed* plots gave considerably larger outturn than the shallow-ploughed plots, the average outturn per acre of the former having been 14 maunds 13 seers and 11 chitaks of grain and 26 maunds 16 seers of straw, and that of the latter having been 10 maunds 21 seers 7 chittaks of grain and 19 maunds 10 seers of straw. The average increase in outturn due to deep ploughing was, therefore, 3 maunds 32 seers 4 chitaks of grain and 7 maunds 6 seers of straw per acre.

Besides the experimental crop of paddy, a crop of *khesari* was taken from all the twelve plots under the experiment. The results are stated in Appendix A (*ii*). It will be seen from appendix A (*ii*) that there was practically no difference between the average outturns of the deep-ploughed and the shallow-ploughed plots.

(2). The second experiment with paddy was to test the usefulness of bone-ash as a manure for paddy. Experiments had proved in previous years that bone-meal was of absolutely no use on the stiff clay soil of the Dumraon farms. It remains to be proved whether bones in any other form such as bone-ash can be made useful as manure for such soils This experiment, which is a permanent one, commenced in the year under report is designed to test this point. For this purpose six plots, each 800 square yards in area, have been selected, three of which will be manured every year with bone-ash at the rate of 6 maunds 2 seers per acre, and the other three will be left unmanured. Their treatment in all other respects will be alike. During the year under report the six plots were treated as above, the results which are tabulated in Appendix B show, however, that the manure has failed to exert the least effect in enhancing the outturn; in fact, the plots manured with bone-ash have on the whole given a slightly less outturn than the unmanured plots. The paddy crop was followed by a catch crop of *khesari*. It will be seen from Appendix B (*ii*) that the average outturn of both grain and straw of *khesari* from the three plots manured with bone-ash was slightly in excess of the average outturn of the three unmanured plots.

(3). At the request of Mr. F. H. B. Skrine, late Collector of Shahabad, an experiment in *aus* paddy was made in two plots of land at the Bhojpur farm. *Aus* paddy is a dry land crop, and unlike winter paddy and the *bhadoi* varieties of paddy grown in Bihar, it cannot stand exposure to water. Mr. Skrine desired to introduce this variety into Shahabad in case the experiment proved it to be suitable to the climate of the district. The seed was procured from the Burdwan district and sown on the 25th June. The crop grew well, but the outturn of grain was very low, having amounted to 2 maunds 35 seers per acre in one plot and to 2 maunds 17 seers in the other. The experiment will be continued for a year or two; it seems to me, however, that no object will be gained by the experiment. *Aus* paddy is grown in Bengal as a means of relief during August, September and October, when the wants of cultivators are the most pressing, and its early harvesting is rendered possible by the anti-monsoon showers which usually fall in Bengal during April and May, and enable the crop to

be sown several weeks before the regular monsoon rains commence. These showers seldom extend to Bihar, so that the crop cannot be sown till June, and harvested till the beginning of October, by which time many other food-grains, such as maize and millets, will have been gathered in.

4. Three experiments were made with wheat during the year under report. The first is a permanent experiment, and is directed to test the effect of bone-ash as a manure for wheat. For this experiment five plots of land, each 800 square yards in area, have been selected: two of these are to be manured every year with bone-ash at the rate of 6 maunds 2 seers per acre, two with bone-ash at the above rate and with saltpetre at 3 maunds per acre, and the fifth to be without any manure.

The second experiment was a casual experiment, and was intended to compare the effects of saltpetre when used at the time of sowing with its effect as a top-dressing. The third experiment was to test the effect of deep ploughing, as compared with that of shallow-ploughing or wheat.

In all the three experiments, the crop grew well and appeared to be flourishing up to the third week of February; but the wet and cloudy weather prevailing in the last days of February and the beginning of March brought on a severe attack of rust, which almost completely ruined the wheat crop of the farm, as well as of the country for many miles around. Since the creation of the farm such a disastrous attack of rust has never been experienced.

5. Among new implements and machines tried during the year, two deserve special mention. One is Crosskill's clodcrusher. This machine was found useful in reducing hard brick-like clods of clay in the sugarcane fields on the Model Farm. The overseer has informed me that some Koeri cultivators of a neighbouring village were much pleased with the implement, and have asked him to lend it to them for preparing potato lands; the other is a bucket water-lift invented by Mr. I. L. Hauser, and was supplied by this Department to the Dumraon estate. It was intended to use it for irrigation, but being workable only by manual power, it could not be economically used for that purpose. An experiment made by me to test the comparative lifting powers of the machine and the *mote* showed that Mr. Hauser's bucket-lift raised 126·76 cubic feet of water in one hour, against 296·04 cubic feet of water raised by the mote, the depth of the well being 25½ feet. The bucket-lift required four men, and the mote four bullocks and two men to keep them at work the whole day. The former cost 10 annas and the latter Re. 1-5 a day; thus for Re. 1, the bucket-lift would raise 202·8 cubic feet and the mote 225·5 cubic feet of water from a well 25½ feet deep to the surface of water. The bucket-lift, though not so useful for irrigation as the mote, has been turned to a highly useful purpose by the Diwan Rai Jai Prokas Lal, C.I.E. The machine has been set over a well, and the water raised by it is stored in a large iron tank. From this townspeople are supplied with pure drinking water through a number of taps, free of cost. In fact, the machine has proved to be the means of a waterwork which, though small and humble in its aims, is none the less useful. In the estimation of the Hindu population, the bucket-lift has one great advantage possessed by few other water-lifts, namely, it is absolutely

free from leather in its construction, and does not require grease or tallow to make it run smooth.

6. The receipts and expenditure of the experimental farms, including those of the Economic Museum at Bhojpur, are exhibited in Appendix C. The receipts which amounted to Rs. 400-13-8 were the smallest realized for many years: the causes of the short receipts were the failure of the wheat crop, and the absence of potatoes and sugarcane from last year's cultivation. The net expenditure on the experimental farm and the Economic Museum at Bhojpur amounted to Rs. 1,320-7-5 against Rs. 1,369-6-6.

7. A model farm has been in existence at Dumraon since 1891. The object with which it was started was to ascertain if the cultivation of a farm with hired labour and as a commercial undertaking will pay. The farm was to be worked with this object in view, and also as a field for applying in practice the lessons taught by the experimental farms at Dumraon. Dr. Leather does not, however, approve of this arrangement, and he would have the Model Farm used for making on a larger scale such experiments as have already yielded reliable results on the experimental farms, and he would even prefer to suspend the Model Farm until the experimental farms have yielded more definite results than those which they at present can lay claim to. I do not, therefore, consider it necessary to go into the results of cultivation last year in detail. The crops grown were sugarcane, winter rice, barley, *khesari*, pease and linseed; the treatment of these crops and the financial results of the farm are exhibited in two statements given in Appendix D. It will be seen that the farm yielded a net profit of Rs. 32-9-10, against Rs. 114-12-9 in the previous year, after having paid the annual rent of Rs. 212-0-5, interest on capital outlay amounting to Rs. 126-2, and depreciation of stock amounting to Rs. 70-15-9. The falling off in net profit was chiefly due to want of rain during the earlier months of the last *rabi* season, and the occurrence of wet, cloudy weather at the end of February and beginning of March, which gave rise to rust and insect-pests; besides a portion of the sugarcane crop had been very badly damaged by a large number of cattle from a neighbouring village and gave a short outturn in consequence.

DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL,
The 6th July 1894.

B. C. BASU,
Assistant Director of Land Records and Agriculture, Bengal.

APPENDIX A(*i*).

Deep versus *shallow cultivation for paddy.*

Plot number.	Plot area in square yards.	Special treatment.	Outturn in 1893-94 per acre. Grain.	Outturn in 1893-94 per acre. Straw.	Remarks.
1	2	3	4	5	6
			Mds. s. ch.	Mds. s. ch.	
1	800	Deep cultivation (5½ inches) ...	14 26 13	24 8 0	This is a "permanent experiment" commenced in 1893-94. The deep cultivation was effected by a Sibpur plough followed by a country plough. All the plots were manured with cowdung at 180 maunds per acre. A crop of *khesari* was taken after the experimental paddy crop—*vide* Appendix A(ii).
3	800	Ditto ditto ...	13 30 8	24 20 0	
6	800	Ditto ditto ...	14 32 14	30 10 0	
8	800	Ditto ditto ...	14 20 12	27 33 0	
9	800	Ditto ditto ..	14 2 10	27 20 0	
11	800	Ditto ditto ...	14 8 11	24 8 0	
2	800	Shallow cultivation (3 inches) ...	10 35 9	21 7 0	
4	800	Ditto ditto ...	11 25 13	19 26 0	
5	800	Ditto ditto ...	10 29 8	18 18 0	
7	800	Ditto ditto ...	10 35 9	20 10 0	
10	800	Ditto ditto ...	9 9 0	16 13 0	
12	800	Ditto ditto ...	9 33 4	19 26 0	
Average of deep cultivated plots			14 13 11	26 16 0	
Do. of shallow ditto			10 21 7	19 10 0	

APPENDIX A(*ii*).

Deep versus *shallow cultivation for khesari as a catch crop after paddy.*

Plot number.	Plot in are in square yards.	Special treatment.	Outturn in 1893-94 per acre. Grain.	Outturn in 1893-94 per acre. Straw.	Remarks.
1	2	3	4	5	6
			Mds. s. ch.	Mds. s. ch.	
1	800	Deep cultivation (5½ inches) ...	14 32 14	15 5 0	*Vide* remarks in Appendix A(*i*).
3	800	Ditto ditto ...	13 6 5	13 24 8	
6	800	Ditto ditto ...	13 12 6	13 30 8	
8	800	Ditto ditto ...	13 13 7	13 30 8	
9	800	Ditto ditto ...	14 14 12	14 33 0	
11	800	Ditto ditto ...	13 20 0	13 24 8	
2	800	Shallow cultivation (3 inches) ...	14 23 13	14 33 0	
4	800	Ditto ditto ...	14 14 12	14 30 0	
5	800	Ditto ditto ...	13 30 8	14 2 10	
7	800	Ditto ditto ...	14 14 12	14 33 0	
10	800	Ditto ditto ...	12 23 10	13 6 5	
12	800	Ditto ditto ...	12 34 4	13 6 5	
Average of deep cultivated plots			13 30 12	14 4 10	
Do. of shallow ditto			13 30 4	14 6 11	

APPENDIX B(*i*).

Bone-ash as manure for Paddy.

Plot number.	Plot area in square yards.	SPECIAL TREATMENT.	OUTTURN IN 1893-94 PER ACRE.		REMARKS.
			Grain.	Straw.	
1	2	3	4	5	6
			MDS. S. C.	MDS. S. C.	
13	800	Bone-ash 6 mds. 2 srs. per acre.	9 33 4	17 39 0	This is a permanent experiment commenced in 1893-94.
15	800	Ditto	10 5 5	17 15 0	
17	800	Ditto	9 27 3	17 39 0	A catch crop of khesari was taken after paddy.
14	800	No manure	9 39 7	17 27 0	
16	800	Ditto	9 27 3	16 25 0	
18	800	Ditto	10 17 7	16 19 0	*Vide* Appendix B(ii).
Average of 3 plots manured with bone-ash			9 35 4	17 31 0	
,, of 3 unmanured plots			10 1 5	16 37 0	

APPENDIX B(*ii*).

Bone-ash as manure for khesari following Paddy.

Plot number.	Plot area in square yards.	SPECIAL TREATMENT.	Outturn in 1893-94 per acre.		REMARKS.
1	2	3	4	5	6
			MDS. S. C.	MDS. S. C.	
13	800	Bone-ash 6 mds. 2 srs. per acre applied to paddy.	15 5 0	16 25 8	*Vide* Appendix B(*i*).
15	800	Ditto	13 33 9	14 2 10	
17	800	Ditto	11 1 10	11 31 14	
14	800	No manure	14 8 11	14 32 14	
16	800	Ditto	13 0 4	12 18 7	
18	800	Ditto	10 35 9	11 13 12	
Average of 3 manured plots			13 13 6	14 6 11	
,, of 3 unmanured plots			12 28 2	13 8 5	

APPENDIX C.

Statement showing expenditure and receipts of the Dumraon Experimental Farms and Bhojpur Economic Museum for 1893-94.

Expenditure.		Amount.	Receipts.	Amount.
1		2	3	4
		Rs. A. P		Rs. A. P.
Establishment		704 0 0	Sale proceeds of—	
Travelling expenses and horse allowance of the overseer		101 0 0	Paddy	55 14 10
	Rs. A. P.		Rab	37 0 0
Cost of cultivation—			Khesari	53 9 9
Labor	139 2 3		Harfar	47 4 2
Feeding of bullocks... ...	154 9 3		Wheat	31 9 9
Seeds and manures	91 5 6		Barley	11 12 6
Land rent and canal dues ...	136 11 6		Straw	104 2 8
	521 12 6	521 12 6	Credited to cultivation on account of works taken by the Model Farm	59 8 0
Construction and repairs of roads and buildings ...		86 12 0		
Purchase of a pair of bullocks		91 15 0		
Stamps and stationery		24 6 9		
Economic Museum		152 13 7		
Miscellaneous		38 9 3		
Total expenditure ...		1,721 5 1	Total receipts ...	400 13 8

APPENDIX D(*i*).

Statement showing treatment and outturn of crops in the Dumraon Model Farm during 1893-94.

No. of field.	Area.	Crop.	Manure used. Kind.	Manure used. Quantity.	Outturn of grain and *gur*.	Outturn of straw and leaves.	Value of outturn.	Remarks.
1	2	3	4	5	6	7	8	9
	A. R. P.			Mds.	Mds. S. C.	Mds. S. C.	Rs. A. P.	
1	2 1 0	Paddy ...	.....	...	18 0 0	32 0 0	31 5 4	*Harfar* is a distinct variety of *khesari*.
		Harfar ...	.....	...	36 0 0	38 10 0	46 2 0	
		Linseed ...	.....	...	1 0 0	.....	4 0 0	
2	2 1 0	Paddy ...	.....	...	17 0 0	20 0 0	29 5 4	
		Harfar ...	.....	...	33 30 0	34 20 0	59 7 0	
		Linseed ...	.....	...	0 35 0	.....	3 8 0	
3	2 1 0	*Harfar* ...	.....	...	31 38 0	33 20 0	56 13 0	
4	2 1 0	Barley and gram.	Cowdung	190	19 24 0	21 10 0	42 7 9	
5	2 1 0	Sugarcane planted on Mauritius system.	Ditto ...	405	90 15 6	.....	324 1 0*	* Includes value of leaves sold Rs. 9-4.
6	2 1 0	Sugarcane planted on country system.	Ashes ... Saltpetre	405 7	43 16 7¼ Cuttings Rs. 5-8.	.....	217 13 3†	† Ditto.
7	2 1 0	Pease ...	.....	...	19 35 0	22 10 0	45 14 6	
8	2 1 0	Do. ...	.....	...	21 10 0	22 35 0	48 10 0	
9	2 1 0	Sugarcane planted on Mauritius system.	Cowdung	500	.....	.....	.....	The crop will be harvested in 1895-96.
10	2 1 0	Ditto ...	Cowdung Saltpetre	500 6¼	.....	.....	.....	Ditto.
11	2 1 30	*Harfar* ...	.....	...	36 0 0	40 10 0	65 2 0	
12	1 1 13	*Do.* ...	.....	...	19 0 0	22 15 0	34 15 0	
13	0 1 20	*Do.* ...	.....	...	5 30 0	7 8 0	10 12 7	

C

APPENDIX D(*ii*).

Receipts and expenditure of the Dumraon Model Farm during 1893-94.

Receipts.	Amount. Rs.	A.	P.
Sale proceeds.			
Paddy	46	10	8
Harfar	203	1	0
Linseed	7	8	0
Pease	71	15	6
Barley and gram ...	31	13	9
Gur	465	6	3
Cane cuttings ...	58	0	0
Straw, bhusa, &c. ...	153	13	7
Surplus stock of seeds ...	90	0	6
Ditto of manures	12	15	0
One bullock	15	0	0
Hire of ploughs ...	91	8	0
Total receipts ...	1,247	12	3

Expenditure.	Amount. Rs.	A.	P.
Cost of cultivation.			
Tillage	70	10	3
Seeds and manures ...	269	6	3
Irrigation	78	14	0
Harvesting and threshing	55	6	6
Cattle feeding ...	299	3	0
Miscellaneous ...	6	10	6
	780	2	6
Value of work taken from the experimental farm	59	8	0
Land rent	212	0	5
Purchase of tools and implements	52	0	0
Sugarcane cultivation charges brought over from 1892-93 ...	219	1	4
	1,322	12	3
Deduct cost of cultivation of sugarcane on 9 acres for season 1894-95 ..	304	11	7
Net cost of cultivation ...	1,018	0	8
Add (*a*) interest on capital outlay of Rs. 2,102-4-7 @ 6 % ...	126	2	0
(*b*) Depreciation of stock @ 10 % on Rs. 469-14-0 and value of a bullock sold	70	15	9
Total cost ...	1,215	2	5
Net profit	32	9	10
GRAND TOTAL ...	1,247	12	3

C. A. P.—Reg. No. 1736J(*a*)—489—24-9-94.